NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date:

Region: Fayetteville Regional Office
County: Montgomery
NC Facility ID: 6200015
Inspector's Name: Jeffrey D. Cole
Date of Last Inspection: 07/09/2020
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Jordan Lumber & Supply, Co.

Facility Address:
Jordan Lumber & Supply, Co.
1959 Highway 109 South
Mount Gilead, NC 27306

SIC: 2421 / Sawmills & Planing Mills General
NAICS: 321912 / Cut Stock, Resawing Lumber, and Planing

Facility Classification: Before: Title V **After:**
Fee Classification: Before: Title V **After:**

Permit Applicability (this application only)

SIP: 02D .0515, 02D .0516, 02D .0521, 02D .0530, 02D .0530(u), 02D .1111, 02D .1806
NSPS: N/A
NESHAP: MACT DDDD
PSD: Yes for VOC
PSD Avoidance: 02D .0530(u) for NOx
NC Toxics: N/A
112(r): N/A
Other: N/A

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Susan Huneycutt Executive Assistant (910) 439-8119 PO Box 98 Mount Gilead, NC 27306	Robert Jordan IV Vice President / COO (910) 439-8108 PO Box 98 Mt. Gilead, NC 27306	Susan Huneycutt Executive Assistant (910) 439-8119 PO Box 98 Mount Gilead, NC 27306

Application Data

Application Number: 6200015.20B
Date Received: 09/01/2020
Application Type: Modification
Application Schedule: PSD

Existing Permit Data
Existing Permit Number: 03469/T28
Existing Permit Issue Date: 10/30/2020
Existing Permit Expiration Date: 02/28/2021

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2019	7.85	74.42	486.33	110.19	36.65	46.55	21.77 [Methanol (methyl alcohol)]
2018	7.41	82.12	454.38	102.01	63.55	43.66	20.32 [Methanol (methyl alcohol)]
2017	6.50	79.65	442.78	81.75	80.33	41.66	19.94 [Methanol (methyl alcohol)]
2016	2.78	32.79	438.39	31.17	45.51	36.12	19.13 [Methanol (methyl alcohol)]
2015	5.47	52.25	490.51	51.20	50.06	43.01	22.86 [Methanol (methyl alcohol)]

Review Engineer: Betty Gatano

Review Engineer's Signature: **Date:**

Comments / Recommendations:
Issue 03469/T29
Permit Issue Date:
Permit Expiration Date:

Table of Contents

1.0 Introduction and Purpose of Application

1.1 Facility Description and Proposed Changes

Jordan Lumber & Supply, Co. (Jordan Lumber) currently holds Title V Permit No. 03469T28 with an expiration date of February 28, 2021 for a lumber mill in Mt. Gilead, Montgomery County, North Carolina.

Jordan Lumber produces dimension lumber from green southern yellow pine. Southern yellow pine logs are trucked to the site and cut into lumber by one of the two sawmills. In the newer of the two sawmills (installed in 2010), the logs are debarked and then cut to specified lengths. The rough-cut lumber is dried in one of seven kilns onsite – four steam-heated lumber kilns (ID Nos. K-1[1], K-3, K-4, and K-5), one direct-fired batch lumber kiln (ID No. K-2), one indirect fired continuous kiln (ID No. K-6) and one direct gasified wood-fired/ natural gas-fired continuous kiln (ID No. K-7). An additional steam heated kiln is permitted (ID No. K-8) but has not yet been constructed.

The green lumber is dried in the kilns for 18-24 hours, depending on the initial moisture content, age, and size of the wood. The dried lumber is finished by planning and trimming in two planer mills (ID Nos. P01 and P02). Finished lumber is sorted by length, size, and grade; packaged; and then shipped off site.

Bark from the logs is sold to customers for processing into landscaping material. Scrap lumber is ground into chips and sold to the Unilin plant adjacent to the Jordan Lumber facility. The remaining green wood chips and planer shavings are sold and shipped off site as byproducts.

Steam for the steam-heated kilns is provided by four wood-fired boilers (ID Nos. B01 through B04) and a natural gas-fired boiler (ID No. B05). The wood-fired boilers are fueled by hardwood bark brought in from chip mills. Jordan Lumber does not typically burn any of the sawdust or bark from its own operations in its boilers, as this material is generally too wet to provide good boiler operations.

The facility currently has approximately 250 employees and operates its boilers and kilns 24 hours a day, seven days a week. The sawmills operate 8 hours per day, five days per week, or more often depending on business demands.

<u>Background and PSD Application</u>

Kiln K-7 was originally permitted and operated as a batch steam heated kiln. Air Permit No. 03469T24 was issued on August 31, 2016 to convert Kiln K-7 to a direct, natural gas-fired continuous lumber drying kiln. The permit was issued as a “Part 1” modification based on potential emissions from the kiln assuming a throughput of 45 million board feet (MMBF) per year. At the time of the “Part 1” permit application, this throughput was thought to be the maximum theoretical throughput of Kiln K-7, but this assumption was not accurate.

[1] Kiln K-1 was originally permitted and operated as steam heated kiln. Kiln K-1 was modified to a direct-fired batch lumber kiln as part of Air Permit No. 03469T15 issued on November 7, 2005. However, Kiln K-1 was never actually modified and continued operating as a steam heated kiln. Kiln K-1 will be permitted as a steam heated kiln as part of the Title V permit renewal application no 6200015.20A submitted on August 17, 2020.

Jordan Lumber submitted permit application No. 6200015.17A for a "Part 2" significant modification under NCAC 02Q .0501(c)(2) on May 12, 2017. An amendment to the "Part 2" permit application was submitted on June 26, 2017 acknowledging the maximum theoretical throughput of Kiln K-7 was not used in the "Part 1" permit. The amendment also requested requirements under 15A NCAC 02D .0530(u) be incorporated into the permit for tracking the Projected Actual Emissions (PAE) for the Kiln K-7 conversion.

Jordan Lumber submitted permit application No. 6200015.17B on June 9, 2017 as minor modification under 15A NCAC 02Q .0515 to add a wood-fired gasification system to Kiln K-7. This modification allowed the kiln to function as a direct, wood-fired gasification, continuous lumber drying kiln. After the modification, Kiln K-7 could operate as either a direct, natural gas-fired kiln or a direct, gasified wood-fired kiln.

Permit applications nos. 6200015.17A and .17B were consolidated for Air Permit No. 03469T25, which was issued on October 23, 2017. This permit incorporated tracking requirements under 15A NCAC 02D .0530(u) for the modification to convert Kiln K-7 to a direct, natural gas/wood-fired continuous lumber drying kiln, assuming a throughput of 45 MMBF per year.

Jordan Lumber submitted permit application no. 6200015.20B on September 1, 2020. In this permit application, the Permittee indicated the future actual production of the kiln is likely to exceed the originally projected estimate of 45 MMBF per year and submitted a new Prevention of Significant Deterioration (PSD) applicability evaluation using the potential emissions from the kiln at the design capacity of the kiln of 67.34 MMBF per year. The change to the calculations (i.e., changing "projected actual emissions" to "potential emissions") represents not only a revision to the previous two PSD applicability determinations but also serves as a permit modification to increase the kiln throughput. With the production increase, volatile organic compound (VOC) emissions increases will exceed the PSD significant emission rate of 40 tons per year (tpy), triggering a PSD review.

Jordan Lumber is requesting this permit be issued as a "one-step" permitting modification under 15A NCAC 02Q. 0501(b)(1) to incorporate this project directly into the Title V permit.

1.2 Plant Location

Jordan Lumber is located at 1939 Highway 109 South, Mount Gilead, North Carolina, which is in southwest Montgomery County. The facility is located in a rural area adjacent to the Uwharrie National Forest and is classified as a Class II area. The only Class I area within 200 kilometers of the Jordan Lumber site is the Linville Gorge Wilderness. Linville Gorge is located approximately 189 kilometers northeast of the site.

Montgomery County is classified as "better than national standards" for total suspended particulates (TSP).[2] and for the 1971 sulfur dioxide (SO2) standards. The county is designated as "unclassifiable/attainment" for carbon monoxide (CO); the 1997 and 2012 annual standards for PM2.5; the 1997 and 2006 24-hour standards for PM2.5; the 2010 SO2 standard; the 2008 Lead standard; the 1997, 2008, and 2015 8-hour standards for ozone; and the 2010 1-hour nitrogen dioxide (NO2) standard. The county is designated as "cannot be classified or better than national standards"

[2] TSP is also referred to as particulate matter (PM), which includes particulate matter less than 10 microns or (PM10).

for the 1971 annual NO2 standard. Therefore, Jordan Lumber is not located in an area designated as non-attainment for any pollutant.

1.3 Permitting History Since Last TV Permit Renewal

Permit	Date	Description
03469T23	March 7, 2016	Air Permit No. 03469T23 was issued. The following permit applications were consolidated under this permit: • Permit Application No. 6200015.15A – The application for permit renewal was received on June 1, 2015. • Permit Application No. 6200015.15B – The application was submitted on September 21, 2015 as a "Part 2" TV permit application for the natural gas fired boiler (ID No. B05), which was added to Air Permit No. 03469T21 issued on January 9, 2013. The Permittee also requested the removal of NC Air toxics requirements in the permit application.
03469T24	August 31, 2016	Air Permit No. 06270T24 was issued as a "Part 1" significant modification under 15A NCAC 02Q .0501(c)(2) to convert a steam-heated batch lumber drying kiln (ID No. K-7) to a direct, natural gas-fired continuous lumber drying kiln. Emissions from Kiln K-7 were assumed to be potential emission based on 45 MMBF per year throughput from this kiln. Jordan Lumber also submitted an amendment to the permit application on June 21, 2016, requesting the Best Available Control Technology (BACT) limits in the permit be revised to reflect the NCDAQ's current VOC emission factors for kilns.
03469T25	October 23, 2017	Air Permit No. 06270T25 was issued. The following applications were consolidated for this permit. • Permit Application No. 6200015.17A was submitted on May 12, 2017 as a "Part 2" significant modification under 15A NCAC 02Q .0501(c)(2) to convert a steam-heated batch lumber drying kiln (ID No. K-7) to a direct, natural gas-fired continuous lumber drying kiln. Emissions from Kiln K-7 were corrected to represented "projected actual emissions" based on 45 MMBF per year throughput from this kiln. Requirements under 15A NCAC 02D .0530(u) for the modification to convert Kiln K-7 to a continuous kiln direct-fired kiln were incorporated as part of this permit modification. • Permit Application No. 6200015.17B was submitted on June 9, 2017 for a minor modification to add a wood-fired gasification system on to Kiln K-7. This modification allowed the kiln to function as a direct, wood-fired gasification, continuous lumber drying kiln. After the modification, Kiln K-7 could operate as either a direct, natural gas-fired kiln or a direct, gasified wood-fired kiln.

Permit	Date	Description
03469T26	November 8, 2018	Air Permit No. 06270T25 was issued as a minor modification under 15A NCAC 02Q .0515 to add two electrostatic precipitators (ESPs) (ID Nos ESP-1 and ESP-2) as controls on the existing wood-fired boilers (ID Nos. B01 through B04) as required pursuant 40 CFR Part 63 Subpart DDDDD.
03469T27	March 29, 2019	Air Permit No. 06270T27 was issued as a one-step significant modification under 15A NCAC 02Q .0501(b)(1) to convert Kiln K-6 (ID No. K-6) from a batch steam kiln to a continuous steam kiln with a throughput of 93 MMBF per year.
03469T28	October 30, 2020	Air Permit No. 06270T28 was issued as an administrative amendment to correct the heat input of the wood-fired boiler with pyrolytic-type burners and without flyash reinjection (ID No. B04) to 28.8 million Btu/hr.

1.4 Application Chronology

Date	Event
August 12, 2020	Pre-application meeting between NCDAQ and Jordan Lumber occurred.
August 13, 2020	Tom Anderson of the Air Quality Analysis Branch (AQAB) of NCDAQ e-mailed personnel from US Forest Service, the Fish and Wildlife Services, and the National Park Service informing them of the project.
September 1, 2020	PSD permit application received.
September 10, 2020	A copy of permit application and modeling was forwarded to US EPA Region 4.
September 10, 2020	A copy of permit application and modeling was forwarded to Federal Land Manager (FLM). Specifically, the documents were forwarded to Andrea Stacy of the National Park Service.
September 10, 2020	A letter was sent to the Permittee indicating the permit application was deemed technically complete.
September 14, 2020	Nancy Jones of the AQAB issued a memorandum approving the Air Quality Impact Analysis submitted in support of the permit application.
September 14, 2020	Jeffrey Cole of the Fayetteville Regional Office (FRO) provided comments on the permit application.
September 16, 2020	Andrea Stacy of the National Park Service indicated the application was being eliminated from an Air Quality Related Values analysis for National Park Service areas.
October 16, 2020	Nancy Jones of the AQAB issued a corrected memorandum approving the Air Quality Impact Analysis.
September/October 2020	Betty Gatano discussed the PSD permit application with Joe Sullivan, consultant for Jordan Lumber, throughout September and October 2020. Numerous e-mails were exchanged regarding emission calculations and other issues related to the permit application.
October 28, 2020	Draft of the permit and permit review forwarded internally for comments.
November 2, 2020	Comments received from Booker Pullen, Permitting Supervisor. Mr. Pullen requested additional information regarding the impact of the kiln modification no downstream emission sources.
November 2, 2020	Joe Sullivan provided an estimate of potential emissions from the planer/hog wood waste collection systems (ID Nos. P01 and P02) due to the conversion of Kiln K-7.
November 3, 2020	Drafts of permit and permit review forwarded to the Permittee for comments.

Date	Event
November 12, 2020	Comments received from Joe Sullivan.
December 23, 2020	Draft permit review and permit forwarded to public notice.

2.0 Emission Sources and Emissions Estimates

Equipment and emissions associated with this PSD modification are discussed in this section.

2.1 Description of Kiln K-7

Kiln K-7 is currently permitted as a direct gasified wood-fired/ natural gas-fired continuous lumber drying kiln, with a 30 million Btu per hour maximum heat input rate when operated as a direct gasified wood-fired kiln and 24 million Btu per hour maximum heat input rate when operated as a direct natural gas-fired kiln. The kiln was originally permitted as an indirect, steam-heated, batch lumber drying kiln and has undergone two permit modifications to arrive at its current permitted configuration.

Air Permit No. 03469T24 was issued to Jordan Lumber on August 31, 2016 to modify Kiln K-7 from an indirect, steam-heated, batch lumber drying kiln to a direct, natural gas-fired, continuous lumber drying kiln. At the time of permitting, the projected maximum kiln production rate for Kiln K-7 was 45 MMBF per year based on an assessment of projected kiln-by-kiln production rates to achieve a maximum projected facility-wide production rate of 300 MMBF per year. The projected maximum production rate for Kiln K-7 represented an approximate 25% increase over the baseline production rate of Kiln K-7 when operating in batch mode.

A wood-fired burner system was added to Kiln K-7 under Permit 03469T25 issued on October 23, 2017. At the time of permitting, the projected production rate of the kiln was assumed to be 45 MMBF per year based on a kiln-by-kiln assessment of projected utilization to achieve a maximum projected facility-wide production rate of 300 MMBF per year.

In this current PSD permit application, Jordan Lumber indicated the future actual production of Kiln K-7 is likely to exceed the originally projected estimate of 45 MMBF per year and estimated lumber production at 67.34 MMBF per year using a potential capacity of 1.295 MMBF per week. Although Kiln K-7 is not anticipated to operate at production rate exceeding 55 MMBF per year, Jordan Lumber requested permitting at a potential 100% capacity utilization (i.e., 67.34 MMBF per year) to maximize future operating flexibility.

2.2 Emissions Associated with the PSD Modification

Jordan Lumber previously avoided a PSD analysis for converting Kiln K-7 to a direct gasified wood-fired/ natural gas-fired continuous lumber drying kiln by using projected actual emissions (PAE) based on kiln throughput of 45 MMBF per year, in accordance with 15A NCAC 02D .0530(u). In this current PSD permit application, Jordan Lumber requested to re-evaluate the conversion of Kiln K-7 using a maximum kiln throughput of 64.37 MMBF per year. The Permittee submitted a new PSD applicability evaluation by performing the comparison test of baseline actual emissions (BAE) to potential to emit (PTE) from this project for all pollutants except NOx. (As discussed in more detail below, NOx emissions were calculated using PAE rather than PTE.)

The BAE for this project have been set to “zero.” This approach conservatively overestimates the emissions increase estimates for the project as post project emissions are not reduced by the BAE.

The PTE estimation methodology used the potential capacity of the kiln of 67.34 MMBF per year and rated burner capacities of 24 MMBtu/hr and 30 MMBtu/hr heat input for natural gas firing and wood firing, respectively. VOC and particulate matter (PM) emissions were determined from NCDAQ's “Wood Kiln Emissions Calculator Revision C” (July 2007) for a “gasifier” kiln. Emissions of SO2, NOx, and CO were not provided in the kiln emission spreadsheet. Instead, emissions for these pollutants were determined from the fuel combustion using NCDAQ’s “Natural Gas Combustion Emissions Calculator Revision M” (06/22/2015) and NCDAQ’s “Woodwaste combustion Emissions Calculator Revision L” (09/03/2019). The PTE were then determined as the maximum of two operating scenarios for Kiln K-7 – operation as a direct gasified wood-fired continuous lumber drying kiln OR operation as a natural gas-fired continuous lumber drying kiln.

Table 1 below compares PTE to the PSD significant emission rates (SER) for PM, PM10, PM2.5, VOC, NOx, SO2, CO, lead (Pb), and carbon dioxide as CO2e. The emission increase accounts for emissions from both the Kiln K-7 conversion and the resulting throughput increase from the planer/hog wood waste collection systems (ID Nos. P01 and P02). As presented in the table, emission increases associated with this project only exceed the SER for VOC. Thus, a PSD review is only triggered for VOC.

Except for NOx, the project emission increase calculations are based on a PTE estimation methodology. NOx emissions were estimated slightly differently due to the different emission factors for dry wood versus wet wood combustion. The dry wood emission factor is much higher than the wet wood factor. Although Kiln K-7 has historically combusted almost exclusively wet sawdust, a 70%/30% blend of wet and dry fuel combusted at the maximum wood burner capacity was used in estimating emissions NOx to allow for operating flexibility. Thus, the NOx emission increase was developed using a PAE methodology versus a PTE methodology used for all other pollutants. Table 2 provides the NOx emissions from the two different operating scenarios associated with Kiln K-7.

Because emission increases for all pollutants except for NOx were calculated using potential emissions, the current 15A NCAC 02D .0530(u) emission tracking condition will be modified to remove all pollutants except NOx as part of this permit modification. The condition requires ten years of tracking of NOx emissions from the kiln because the “project involves increasing the emissions unit’s design capacity or its potential to emit the regulated NSR pollutant.”

Emission calculations are provided in Attachment 2 to this document.

Table 1 – Potential Emissions Resulting from Converting Kiln K-7 to a Direct Gasified Wood-Fired/ Natural Gas-Fired Continuous Lumber Drying Kiln

<table>
<tr><th rowspan="2">Pollutant</th><th colspan="3">Scenario 1
Kiln K-7 Firing NG</th><th colspan="3">Scenario 2
Kiln K-7 Firing Wood</th><th rowspan="2">Emissions Planer/Hog Wood Waste Collection Systems (tpy)</th><th rowspan="2">Emission Increase (tpy)</th><th rowspan="2">PSD SER (tpy)</th><th rowspan="2">Below PSD SER</th></tr>
<tr><th>Wood Drying in Kiln (tpy)</th><th>Natural Gas Combustion (tpy)</th><th>Total Emissions (tpy)</th><th>Wood Drying in Kiln (tpy)</th><th>Wood Combustion (tpy)</th><th>Total Emissions (tpy)</th></tr>
<tr><td>Total PM</td><td rowspan="3">4.71</td><td rowspan="3">--</td><td rowspan="3">4.71</td><td rowspan="3">4.71</td><td rowspan="3">--</td><td rowspan="3">4.71</td><td rowspan="3">3.94E-4</td><td rowspan="3">4.71</td><td>25</td><td>Y</td></tr>
<tr><td>PM10</td><td>15</td><td>Y</td></tr>
<tr><td>PM2.5</td><td>10</td><td>Y</td></tr>
<tr><td>SO_2</td><td>--</td><td>0.06</td><td>0.06</td><td>--</td><td>3.29</td><td>3.29</td><td>--</td><td>3.29</td><td>40</td><td>Y</td></tr>
<tr><td>CO</td><td>--</td><td>8.66</td><td>8.66</td><td>--</td><td>78.84</td><td>78.84</td><td>--</td><td>78.84</td><td>100</td><td>Y</td></tr>
<tr><td>VOC</td><td>146.1</td><td>--</td><td>146.1</td><td>146.1</td><td>--</td><td>146.1</td><td>--</td><td>146.1</td><td>40</td><td>N</td></tr>
<tr><td>Lead</td><td>--</td><td>5.15E-05</td><td>5.15E-05</td><td>--</td><td>6.31E-03</td><td>6.31E-03</td><td>--</td><td>6.31E-03</td><td>0.6</td><td>Y</td></tr>
<tr><td>CO2e</td><td>--</td><td>12,310</td><td>12,310</td><td>--</td><td>27,548</td><td>27,548</td><td>--</td><td>27,548</td><td>75,000</td><td>Y</td></tr>
</table>

Notes:

- Baseline actual emissions were set to “zero” as a conservative assumption.
- Potential emissions from drying wood in the Kiln K-7 were based on kiln throughput of 67.34 MMBF per year. Emissions were determined from NCDAQ's “Wood Kiln Emissions Calculator Revision C” (July 2007) for a “gasifier” kiln. Kiln emissions were assumed to include combustion emissions for PM and VOC.
- Emissions from natural gas combustion were based on NCDAQ’s “Natural Gas Combustion Emissions Calculator Revision M” (06/22/2015), a maximum heat input of 24 million Btu/hr, and 8,760 hours of operation.
- Emissions from combustion of wood were based on NCDAQ’s “Woodwaste combustion Emissions Calculator Revision L” (09/03/2019), a maximum heat input of 30 million Btu/hr, and 8,760 hours of operation.
- CO2e emissions were calculated with 40 CFR Part 98 Mandatory Reporting Rule factors for wood and natural gas firing.
- PM/PM10/PM2.5 emissions from planer/hog wood waste collection systems based on throughput of 67.34 MMBF per year and an emission factor based on mass balance from past study at plant of 0.0117 lb/1,000 BD ft. This value was multiplied by a 99.9% control efficiency for the baghouse.

Table 2 – PAE for NOx Emissions from Kiln K-7

Pollutant	Scenario 1 Kiln K-7 Firing NG			Scenario 2 Kiln K-7 Firing Wood			Emission Increase (tpy)	PSD SER (tpy)	Below PSD SER
	Emission Factor for Natural Gas (lb/mmBtu)	Maximum Heat Input of Burner (mmBtu/hr)	Natural Gas Combustion (tpy)	Emission Factor for Wood (lb/mmBtu)	Maximum Heat Input of Burner (mmBtu/hr)	Wood Combustion (tpy)			
NO_x	0.098	24	10.31	0.301	30	39.55	39.55	40	Y

Notes:

- Baseline actual emissions were set to "zero" as a conservative assumption.
- Emissions from natural gas combustion were based on NCDAQ's "Natural Gas Combustion Emissions Calculator Revision M" (06/22/2015), a maximum heat input of 24 million Btu/hr, and 8,760 hours of operation.
- Emissions from combustion of wood were based on NCDAQ's "Woodwaste combustion Emissions Calculator Revision L" (09/03/2019), a maximum heat input of 30 million Btu/hr, and 8,760 hours of operation, with the exception of NOx.
- Emissions for NOx were calculated with the combustion spreadsheet and assuming a 70%/30% blend of wet and dry fuel combusted at the maximum heat input of the burner. The overall emission factor used in the NOx emission calculation is shown below:

  Dry Wood EF = 0.49 lb/mmBtu
  Wet Wood EF = 0.22 lb/mm Btu
  Overall EF = 0.30 * (0.49) + 0.70 * (0.22)
  Overall EF = 0.301 lb/mmBtu

  This assumption is unnecessary for emissions of SO2, CO, or Pb because the emission factors for wet and dry wood are the same for these pollutants.

3.0 Project Regulatory Review

The direct gasified wood-fired/natural gas-fired continuous lumber kiln (ID No. K-7) is subject to regulations discussed in this section.

- 15A NCAC 02D .0515, Particulates from Miscellaneous Industrial Processes – The kiln is subject to 02D .0515. Allowable emissions of PM are calculated from the following equation, for process weight rates up to 30 tons/hr:

  $$E = 4.10(P)^{0.67}$$

  Where E = allowable emission rate in pounds per hour
  P = process weight in tons per hour

  The process weight (P) and allowable emissions (E) are estimated as follows:

Measure	Value	Source
Throughput of lumber	Throughput = 7,687 BF/hr V = 7,687 BF/hr * 0.0833 ft^3/BF = 640 ft^3/hr	Assuming a projected throughput of 67.34 MMBF per year and continuous operations. A board foot (BF) is actually a measure of volume. By definition, a board foot is one square foot one inch thick. 1 BF = 144 in^3 = 0.0833 ft^3
Density of lumber	53 lb/ft^3	Maximum density for fresh, southern yellow pine Reference for properties of wood species at http://www.engineeringtoolbox.com/weigt-wood-d_821.html
Process Weight	P = Volume (ft^3/hr) * Density (lb/ft^3) * Conversion factor (ton/lb) P = (640 ft^3/hr) (53 lb/ft^3) (ton/2000 lb) P = 16.97 tons/hr	
Allowable PM Emissions	$E = 4.10(P)^{0.67}$ $E = 4.10(16.97 \text{ ton/hr})^{0.67}$ E = 27.3 lb/hr	

  Potential emissions of PM from Kiln K-7 are 4.71 tons per year or 1.08 lb/hr. This emission rate is much less than the allowable PM emissions. The Permittee is required to maintain production records of lumber dried in Kiln K-7. No other monitoring, recordkeeping, or reporting is required to demonstrate compliance with the particulate matter standard. Continued compliance is anticipated.

- 15A NCAC 02D .0516, Sulfur Dioxide from Combustion Sources – No monitoring, recordkeeping, or reporting is required when firing natural gas or wood in the kiln because of the low sulfur content of these fuels. Natural gas and wood are inherently low enough in sulfur that continued compliance is expected.

- 15A NCAC 02D .0521, Control of Visible Emissions – Kiln K-7 was manufactured after July 1, 1971 and must not have visible emissions of more than 20 percent opacity when averaged over a six-minute period, except as specified in 15A NCAC 02D .0521(d). No monitoring, recordkeeping, or reporting is required to demonstrate compliance with 02D .0521. Continued compliance is anticipated.

- 15A NCAC 02D .0530, Prevention of Significant Deterioration –The conversion of Kiln K-7 is major modification under PSD and triggers a BACT analysis for VOC emissions, as discussed in detail in Section 4.0 below.

- 15A NCAC 02D .0530(u) – Jordan Lumber used PAE for NOx emissions to demonstrate the kiln conversion is not a major modification under PSD. Recordkeeping and reporting requirements under 02D .0530(u) will be updated in the permit for NOx emissions for Kiln K-7.

- 15A NCAC 02D .1111, Maximum Achievable Control Technology (MACT) – Kiln K-7 is subject to the “NESHAP for Plywood and Composite Wood Products,” 40 CFR Part 63 Subpart DDDD. The modification to convert this kiln to a direct gasified wood-fired/ natural gas-fired continuous lumber drying kiln was less than 50 percent of the fixed capital cost of constructing a new kiln. As such, the conversion does not meet the definition of reconstruction under the MACT, and the kiln remains classified as an existing kiln under 40 CFR Part 63 Subpart DDDD.

  Per 40 CFR 63.2252, lumber kilns and other process units not subject to the compliance options under 40 CFR 63.2240 are not required to comply with the provisions of 40 CFR Part 63 Subpart DDDD or Subpart A, except for the initial notification requirements. The Permittee previously submitted initial notifications for its existing kilns, and no further action is needed under this modification.

- 15A NCAC 02D .1806, Control and Prohibition of Odorous Emissions – This condition is applicable facility-wide and is state enforceable only. No changes are needed under this modification, and continued compliance is anticipated.

4.0 Prevention of Significant Deterioration

The basic goal of the PSD regulations is to ensure the air quality in clean (i.e., attainment) areas does not significantly deteriorate while maintaining a margin for future industrial growth. The PSD regulations focus on industrial facilities, both new and modified, that create large increases in the emission of certain pollutants. The US EPA promulgated final regulations governing the PSD in the Federal Register published August 7, 1980. Effective March 25, 1982, the NCDAQ received full authority from the US EPA to implement PSD regulations in the state. North Carolina has incorporated US EPA’s PSD regulations (40 CFR 51.166) into its air pollution control regulations in 15A NCAC 02D .0530 and 02D .0531.

4.1 PSD Applicability

Under PSD requirements all major new or modified stationary sources of air pollutants regulated and listed in this section of the Clean Air Act must be reviewed and approved prior to construction by the permitting authority. A major stationary source is defined as any one of 28 named source categories that has the potential to emit 100 tons per year of any regulated pollutant or any other stationary source that has the potential to emit 250 tons per year of any PSD regulated pollutant.

Jordan Lumber is an existing major stationary source under PSD because it has the potential to emit VOCs in excess of 250 tons per year. This modification is a major modification under PSD because emissions of VOC exceed the SER, as noted previously.

The elements of a PSD review are as follows:

1) A BACT Determination as determined by the permitting agency on a case-by-case basis in accordance with 40 CFR 51.166(j),
2) An Air Quality Impacts Analysis including Class I and Class II analyses, and
3) An Additional Impacts Analysis including effects on soils and vegetation and impacts on local visibility in accordance with 40 CFR 51.166(o).

4.2 BACT Analysis

Under PSD regulations, the basic control technology requirement is the evaluation and application of BACT. BACT is defined as follows [40 CFR 51.155 (b)(12)]:

> *An emissions limitation...based on the maximum degree of reduction for each pollutant... which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.*

As evidenced by the statutory definition of BACT, this technology determination must include a consideration of numerous factors. The structural and procedural framework upon which a decision should be made is not prescribed by Congress under the Act. This void in procedure has been filled by several guidance documents issued by the US EPA. The only final guidance available is the October 1980 "Prevention of Significant Deterioration – Workshop Manual." As the US EPA states on page II-B-1, "A BACT determination is dependent on the specific nature of the factors for that **particular case**. The depth of a BACT analysis should be based on the quantity and type of pollutants emitted and the **degree of expected air quality impacts**." (emphasis added). The US EPA has issued additional DRAFT guidance suggesting the use of what they refer to as a "top-down" BACT determination method. While the US EPA Environmental Appeals Board recognizes the top-down approach for delegated state agencies,[3] this procedure has never undergone rulemaking and as such, the process is not binding on fully approved states, including North Carolina.[4] The Division prefers to follow closely the statutory language when making a BACT determination and therefore bases the determination on an evaluation of the statutory factors contained in the definition of BACT in the Clean Air Act. As stated in the legislative history and in US EPA's final October 1980 PSD Workshop Manual, each case is different and the State must decide how to weigh each of the various BACT factors. North Carolina is concerned that the application of US EPA's DRAFT suggesting a top-down process will result in decisions that are inconsistent with the Congressional intent of PSD and BACT. The following are passages from the legislative history of the Clean Air Act and provide valuable insight for state agencies when making BACT decisions.

---

[3] See, https://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/PSD+Permit+Appeals+(CAA)?OpenView for various PSD appeals board decisions including standard for review.

[4] North Carolina has full authority to implement the PSD program, 40 CFR Sec. 52.1770

> The decision regarding the actual implementation of best available technology is a key one, and the committee places this responsibility with the State, to be determined on a case-by-case judgment. It is recognized that the phrase has broad flexibility in how it should and can be interpreted, depending on site.
>
> In making this key decision on the technology to be used, the State is to take into account energy, environmental, and economic impacts and other costs of the application of best available control technology. The weight to be assigned to such factors is to be determined by the State. Such a flexible approach allows the adoption of improvements in technology to become widespread far more rapidly than would occur with a uniform Federal standard. The only Federal guidelines are the US EPA new source performance and hazardous emissions standards, which represent a floor for the State's decision.
>
> This directive enables the State to consider the size of the plant, the increment of air quality which will be absorbed by any particular major emitting facility, and such other considerations as anticipated and desired economic growth for the area. This allows the States and local communities to judge how much of the defined increment of significant deterioration will be devoted to any major emitting facility. If, under the design which a major facility proposes, the percentage of increment would effectively prevent growth after the proposed major facility was completed, the State or local community could refuse to permit construction or limit its size. This is strictly a State and local decision; this legislation provides the parameters for that decision.
>
> One of the cornerstones of a policy to keep clean areas clean is to require that new sources use the best available technology available to clean up pollution. One objection which has been raised to requiring the use of the best available pollution control technology is that a technology demonstrated to be applicable in one area of the country may not be applicable at a new facility in another area because of the differences in feedstock material, plant configuration, or other reasons. **For this and other reasons the Committee voted to permit emission limits based on the best available technology on a case-by-case judgment at the State level**. [emphasis added]. This flexibility should allow for such differences to be accommodated and still maximize the use of improved technology.
>
> *Legislative History of the Clean Air Act Amendments of 1977.*

The BACT analyses provided by Jordan Lumber for the proposed project were conducted consistent with the above definition as well as US EPA's five step "top-down" BACT process. The "top down" methodology results in the selection of the most stringent control technology in consideration of the technical feasibility and the energy, environmental, and economic impacts. Control options are first identified for each pollutant subject to BACT and evaluated for their technical feasibility. Options found to be technically feasible are ranked in order of their effectiveness and then further evaluated for their energy, economic, and environmental impacts. In the event that the most stringent control identified is selected, no further analysis of impacts is performed. If the most stringent control is ruled out based upon economic, energy, or environmental impacts, the next most stringent technology is similarly evaluated until BACT is determined.

After establishing the baseline emissions levels required to meet any applicable NSPS, NESHAPs, or SIP limitations, the "top-down" procedure followed for each pollutant subject to BACT is outlined as follows:

- Step 1: Identify all available control options - from review of US EPA RACT/BACT/LAER Clearinghouse (RBLC), agency permits for similar sources, literature review and contacts with air pollution control system vendors.
- Step 2: Eliminate technically infeasible options - evaluation of each identified control to rule out those technologies that are not technically feasible (i.e., not available and applicable per US EPA guidance).
- Step 3: Rank remaining control technologies - "Top-down" analysis, involving ranking of control technology effectiveness.
- Step 4: Evaluate most effective controls and document results – Economic, energy, and environmental impact analyses are conducted if the "top" or most stringent control technology is not selected to determine if an option can be ruled out based on unreasonable economic, energy or environmental impacts.
- Step 5: Select the BACT – the highest-ranked option that cannot be eliminated is selected, which includes development of an achievable emission limitation based on that technology.

4.3. References Used to Identify Control Technologies

The references and methodologies discussed in this section were used to identify control technologies considered in the BACT analyses found in Section 4.4.

- RACT/BACT/LAER Clearinghouse (RBLC) database located on EPA's Technology Transfer Network in the EPA electronic bulletin board system. Specifically, the Permittee performed a search of the RBLC database using the category for wood lumber kilns (RBLC Code 30.800) for projects since 2005;

- State issued air permits was conducted for similar manufacturing facilities; and

- Review of technologies in use at similar sources.

4.4. BACT Review for VOC Emission Sources

4.4.1 Identify Control Technologies

Based on the review of RBLC, relevant literature, and industry knowledge, the following control technologies were considered in the BACT analysis for VOC emissions from Kiln K-7:
- Carbon adsorption;
- Condensation;
- Regenerative thermal or Catalytic Oxidation;
- Biofiltration; and
- Work practices.

<u>Carbon Adsorption</u>
Carbon adsorption systems use an activated carbon bed to trap VOCs. As the exhaust gas stream passes through the activated carbon bed, VOC molecules are adsorbed onto the surface of the

activated carbon, and clean exhaust gas is discharged to the atmosphere. A typical carbon adsorption system for continuous operation includes two activated carbon beds, such that one bed can be desorbing/idle while the other is adsorbing. When the activated carbon in one bed is spent and can no longer effectively adsorb VOC, the bed is taken offline for regeneration, and the VOC-containing gas stream is diverted to the fresh activated carbon bed. This switching allows for the source to operate continuously without shutting down. Regeneration of the sorbent can be achieved either via heating with steam or via vacuuming to remove VOC from the surface.

Depending on the application, carbon adsorption systems can typically achieve VOC control efficiencies of 95%.[5] Adsorption systems have been successfully used in industry types such as organic chemical processing, varnish manufacture, synthetic rubber manufacture, production of selected rubber products, pharmaceutical processing, graphic arts operations, food production, dry cleaning, synthetic fiber manufacture, pressure sensitive tape manufacturing, and other coating operations.

Condensation

Condensers operate by separating volatile compounds in a vapor mixture from the remaining vapors by means of saturation followed by a phase change. Condensers are typically refrigerated to decrease the temperature to aid in saturation and therefore increase the removal efficiencies of the units. There are two common types of condensers used for VOC removal – surface and contact condensers. The coolant does not contact the gas stream in surface condensation; the vapor condenses as a film on the cooled surface and then discharges to a collection tank. Conversely, the vapor stream is sprayed with a liquid coolant in a contact condenser. The VOCs contained within the waste coolant often create a disposal problem because they cannot be recycled or separated from the stream without additional processing.

Because the condenser's removal efficiency is highly dependent on the characteristics of the waste gas stream, they are only feasible for removing certain compounds. Compounds with high boiling points and low volatility are more easily condensable than compounds with low boiling points and high volatility. EPA recommends, as a conservative starting point for considering condensers as a control, that the VOCs have boiling points above 100^{o} F.

Regenerative Catalytic or Thermal Oxidation

The principles utilized in both a regenerative catalytic oxidizer (RCO) and regenerative thermal oxidizer (RTO) are based on simple chemistry and heat transfer phenomena. Oxidation technologies have been widely accepted as the most effective technologies for VOC destruction for a variety of process types.

Oxidation, or combustion, of VOC involves a chemical reaction between hydrocarbons and oxygen to form carbon dioxide and water vapor. Combustion of VOC emission streams occurs spontaneously at elevated temperatures, which are typically attained by combustion of an auxiliary fuel within the combustion zone of the oxidizer. The percent conversion of VOC to carbon dioxide and water is dependent upon temperature and residence time of the VOC in the fuel combustion zone.

---

5 New Jersey DEP's State of the Art (SOTA) *Manual for Chemical and Pharmaceutical Processing and Manufacturing Industries* (July 1997). http://www.state.nj.us/dep/aqpp/downloads/sota/sota5.pdf

Combustion of VOCs in the presence of a catalyst is referred to as "catalytic oxidation" and allows oxidation to occur at substantially lower temperatures, thereby requiring less auxiliary fuel to maintain the desired temperature. In an RCO the catalysts are typically based on a noble metal and can be contained in a fixed or fluidized bed. Despite the decreased oxidation temperature, process exhaust gas must still be preheated, typically through heat exchange or direct heating in a combustion chamber, prior to contact with the catalyst bed. Catalytic oxidizers are sensitive to particle contamination and can normally only be used on very "clean" exhaust streams containing little or no particulate matter.

Regenerative thermal oxidation systems operate on the same principal of reacting VOC in the presence of oxygen at elevated temperatures; however, the heat generated by combustion of auxiliary fuel and VOC is "reused" to reduce the amount of auxiliary fuel necessary for VOC oxidation. VOC oxidation is accomplished by passing the emission stream being controlled through a heated "bed" of media such as ceramic packing to preheat the emission stream, followed by a final combustion zone in which auxiliary fuel is burned to "boost" the stream to the required combustion temperature. Exhaust from the combustion zone is then passed through another packed bed, which absorbs and retains heat until it can be used to preheat the exhaust stream. Airflow is periodically switched to allow beds through which hot exhaust gases have passed to preheat the emission stream prior to passing through the combustion zone. Regenerative systems are typically designed to recover nearly all of the heat of combustion, greatly reducing auxiliary fuel requirements. Thermal oxidation is most economical when the inlet concentration is between 1,500 and 3,000 ppmv VOC because the heat of combustion of the hydrocarbon gases is sufficient to sustain combustion with the addition of expensive auxiliary fuel.

Biofiltration

Biofiltration offers a cost-effective alternative to traditional thermal and catalytic oxidation systems in limited situations. Because biofilters are dependent upon biological activity to destroy VOC, removal efficiencies of biofilters are widely variable. In limited applications, this air pollution control technology can provide a reduction in VOC emissions of 60 to 99.9%.[6]

Specifically in biofiltration, VOCs are oxidized using living micro-organisms on a media bed (sometimes referred to as a “bioreactor”). A fan is typically used to collect or draw contaminated air from a building or process. If the air is not properly conditioned (heat, humidity, solids), then pre-treatment is a necessary step to obtain optimum gas stream conditions before introducing it into the bioreactor. As the emissions flow through the bed media, the pollutants are absorbed by moisture on the bed media and come into contact with the microbes. Depending on the volume of air required to be treated, the footprint of a biofiltration system can be excessive and take up significant acreage. The microbes consume and metabolize the excess organic pollutants, converting them into CO_2 and water, much like a traditional thermal and catalytic oxidation process.

Work Practices

VOC emissions from Kiln K-7 are primarily generated as a result of drying the wood in the kiln and to a much lesser extent, wood or natural gas combustion in the kiln burners. The naturally occurring VOCs in the lumber are driven off by the heat used to dry the lumber. Emissions of VOCs are largely proportional to the amount of moisture removal from the lumber (i.e., the lower the target moisture content, the higher the VOC emissions).

---

[6] EPA, *Using Bioreactors to Control Air Pollution*, EPA-456/R-03-003. ttps://www3.epa.gov/ttncatc1/dir1/fbiorect.pdf

The naturally occurring VOCs in the lumber are driven off from the heat used to dry the lumber. Lumber must be dried to a specific moisture content to have the correct properties for the customers. However, over drying of the lumber would result in poor lumber quality and in the release of additional VOCs. Therefore, the optimal control of moisture levels is necessary to maintain the lumber quality and minimizing VOC emissions.

The RBLC database shows several wood products facilities that evaluated controls for VOC on kilns and none of these facilities have add-on controls; rather, they utilize good operation and maintenance practices to minimize VOC emissions.

4.4.2 Eliminate Technically Infeasible Options

Of the five control technologies identified in Section 4.1.1 above, only work practices have been commercially demonstrated as a viable VOC control technology for lumber kilns. Additional technical feasibility analyses for each of the add-on control technologies identified in Section 4.1.1 is presented below.

Carbon Adsorption

Both the high temperature and high relative humidity of the exhaust from Kiln K-7 would limit the effectiveness of carbon adsorption as a VOC control technology for these sources. Carbon adsorption is not recommended for exhaust streams with relative humidity above 50% or temperatures above 150 °F. When the exhaust stream has a high relative humidity, the water molecules and VOCs in the exhaust stream compete for active adsorption site on the carbon, drastically reducing the efficiency and overall effectiveness of the adsorbent. Additionally, the high temperatures of the exhaust stream would be in the range normally used to desorb VOCs from the carbon and would prevent effective adsorption.

The exhaust from a lumber drying kiln is saturated with moisture (well over 50% moisture) for extended periods of the drying cycle. Exhaust temperatures vary according to the drying cycle in conventional batch kilns and can regularly reach 180°F.[7] Given that the moisture content and temperature of the lumber dry kiln exhaust gases is not within the recommended range and that the technology has never been commercially applied to a lumber dry kiln, carbon adsorption is not considered a feasible control technology for lumber kilns.

Condensation

In the context of kiln exhaust, the exhaust stream must be cooled to a temperature low enough such that the vapor pressure of the exhaust gases is lower than the dew point of the VOCs being condensed. The primary constituents of the VOC in the exhaust gas stream from the lumber kilns are terpenes. The temperature the exhaust stream must be to be lowered to well below 0 °F in the condenser to pass through the dew point of the terpenes because of the low partial pressure/concentration present in the exhaust stream. Operating with the condenser tubes at a temperature of 0 °F would cause the water vapor in the stream to freeze on the outside of the condenser tubes, and the resulting layer of ice would materially impair the heat transfer process. In addition to coating the condenser tubes with ice, any terpenes that would condense would be very

---

[7] Simpson, William T., ed. 1991. Dry Kiln Operators Manual. Agric. Handbook AH-188. Madison, Wl: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory,

sticky and further foul the condenser tubes. For these reasons, condensation is not technically feasible to control VOC emissions from lumber kilns.

Regenerative Catalytic or Thermal Oxidation

As noted above, catalytic oxidizers are sensitive to particle contamination. Because Kiln K-7 is direct-fired kiln where the ash from the wood fired burners may carry over to the add on controls, an RCO would not be a technically feasible control option.

Also as discussed previously, several technical issues are associated with exhaust capture for lumber kilns. One of the most problematic concerns is that withdrawal of exhaust from the kiln will upset the drying conditions within the kiln and adversely impact product quality. Careful control of humidity and temperature conditions is critical to ensure merchantable product quality and uniformity.

Use of regenerative thermal oxidation systems are not considered technically feasible for the reasons provided above and, hence, they are eliminated from further consideration in the BACT analysis

Biofiltration

Biofilters are extremely sensitive to several exhaust stream characteristics including moisture content, temperature, VOC species and concentration, and bed retention time. Generally, biofiltration is an efficient control method for an exhaust stream with a consistent flow of VOC and relatively low operating temperature. Manufacturer data are unavailable for a biofiltration system that would control an exhaust gas stream with characteristics similar to that for a lumber kiln, which has a variable flow rate, moisture content, temperature, and VOC concentration over the kiln cycle. Microorganisms in biofilters that break down VOCs generally do not thrive at temperatures more than 110 °F.[8] Kiln exhaust temperatures throughout the kiln will vary from approximately 110 °F to 180 °F with an average exhaust temperature well above the 110 °F maximum for the microorganisms. Such high temperatures would readily kill the VOC-consuming microorganisms in the system. No system has been demonstrated in practice for cooling kiln exhaust streams to the appropriate temperatures, and, hence, the use biofiltration is eliminated because of technical infeasibility.

4.4.3 Rank Remaining Control Technologies by Effectiveness

Work practice standards are the only remaining technically feasible control technology for lumber kilns.

4.4.4 Evaluate Technically Feasible Control Options

The only technically feasible control option is work practice standards, and no adverse economic, environmental, or energy impacts are associated with implementing work practices to limit VOC emissions from the Kiln K-7.

4.4.5 Select BACT for VOC Emissions

[8] Biofilters operating at higher temperatures (130 °F) utilizing thermophilic bacteria are used to treat organic hazardous air pollutants in wood products operations, but these biofilters are ineffective in treatment of terpenes (the predominant VOC in lumber kiln exhaust).

Results of the BACT analysis indicate no technologically feasible add-on control technology for lumber kilns. Jordan Lumber proposes a work practices standard as BACT and emission limit of 4.34 pounds per thousand board feet (lb/MBF), which is equivalent to the latest VOC emission factor for gasifier kilns found in NCDAQ's "Wood Kiln Emissions Calculator."[9]

The NCDAQ concurs with the Permittee's proposal. The NCDAQ has determined work practice standards of proper operation and maintenance consistent with the manufacturer's recommendation is BACT for VOC emissions from the Kiln K-7, and the BACT emission limit is 4.34 lb/MBF of VOC as pinene from the kilns.

4.5 Proposed BACT

Based on the BACT analyses for the PSD project discussed in Section 4.4 above, the NCDAQ has determined the technology and limitations presented in the following table are BACT for Kiln K-7 at Jordan Lumber.

Table 4 – BACT Limits for Kiln K-7

Emission Source	Pollutant	Control Technology or Work Practice	Proposed Emission Limit
One direct gasified wood-fired/ natural gas-fired continuous lumber kiln (ID No. K-7)	VOC (as pinene)	Work practice standards	4.34 lb/MBF as pinene

The BACT permit condition for Kiln K-7 is provided as follows:

6. 15A NCAC 02D .0530: PREVENTION OF SIGNIFICANT DETERIORATION

a. The Permittee shall comply with all applicable provisions, including the notification, testing, reporting, recordkeeping, and monitoring requirements in accordance with 15A NCAC 02D .0530, "Prevention of Significant Deterioration of Air Quality" as promulgated in 40 CFR 51.166.

b. The following emission limits shall not be exceeded:

Emission Source	Pollutant	BACT Limit	Averaging Period	Technology
One direct gasified wood-fired/ natural gas-fired continuous lumber kiln **(ID No. K-7)**	VOC (as pinene)	4.34 lbs/ thousand board feet	n/a	Good design and operating practices

c. To ensure compliance with the emission limits given in Section 2.1 D.6.b above, the Permittee shall not exceed 67.34 million board feet per year of lumber dried in the direct gasified wood-fired/ natural gas-fired continuous lumber kiln **(ID No. K-7).**

<u>Testing</u> [15A NCAC 02Q .0508(f)]

d. If emissions testing is required, the testing shall be performed in accordance with General Condition JJ. If the results of this test are above the limit given in Section 2.1 D.6.b above,

[9] NCDAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007).

the Permittee shall be deemed in noncompliance with 15A NCAC 02D .0521.

Monitoring/Recordkeeping [15A NCAC 02Q .0508(f)]

e. The Permittee shall operate and maintain the direct gasified wood-fired/ natural gas-fired continuous lumber kiln **(ID No. K-7)** in accordance with the manufacturer's specifications or a site-specific plan approved by the NC DAQ Regional Administrator. The Permittee shall record any maintenance performed on the kiln each month in a logbook (written or electronic format) on-site and made available to an authorized representative upon request.
f. To ensure compliance with the limits in Section 2.1 D.6.b above, the Permittee shall calculate the following:
   i. the monthly production rate and the 12-month production rate of the kiln (**ID No. K-7)**.
   ii. the monthly VOC emissions and the 12-month VOC emissions from kiln (**ID No. K-7)**. VOC emissions shall be determined by multiplying the total amount of lumber dried in the kilns by an emission factor of 4.34 pounds of VOC emissions per thousand board feet of lumber dried.
g. The Permittee shall record the production rates and VOC emissions specified in Sections 2.1 D.6.f above each month in a logbook (written or electronic format) on-site and made available to an authorized representative upon request.
h. The Permittee shall be deemed in noncompliance with 15A NCAC 02D .0530 if the 12-month rolling average production exceeds 67.34 million board feet per year from lumber kiln **(ID No. K-7)** OR if the monitoring and recordkeeping activities in Sections 2.1 D.6.e through g above are not met.

Reporting [15A NCAC 02Q .0508(f)]

i. The Permittee shall submit a summary report of monitoring and recordkeeping activities given in Sections 2.1 D.6.e through g above postmarked on or before January 30 of each calendar year for the preceding six-month period between July and December and July 30 of each calendar year for the preceding six-month period between January and June. The report shall contain the following:
   i. The monthly volatile organic compound emissions from the kiln **(ID No. K-7)** the previous 17 months. The emissions must be calculated for each of the 12-month periods over the previous 17 months; and
   ii. The monthly quantities of lumber dried in the kiln **(ID No. K-7)** each kiln for the previous 17 months. The amount of lumber dried must be calculated for each of the 12-month periods over the previous 17 months
   iii. All instances of deviations from the requirements of this permit shall be clearly identified.

5.0 PSD Air Quality Impact Analysis

The PSD modeling analysis described in this section was conducted in accordance with current NCDAQ and US EPA PSD directives and modeling guidance.

5.1 Class II Area Significant Impact Air Quality Modeling Analysis

A significant impact analysis was conducted only for VOC's as an ozone precursor given that project emission increases were below the SERs for the other PSD pollutants with Class II Area Significant Impact Levels (SIL).

5.1.1 Class II Area Tier 1 Screening Analysis for Ozone Precursors

A Tier 1 screening analysis was conducted to evaluate project precursor emissions impacts on secondary formation of ozone in Class II areas. The screening analysis was based on methodologies taken from EPA's *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier I Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program*. MERPs are defined as the screening emission level (tpy) above which project precursor emissions would conservatively be expected to have a significant impact on secondary $PM_{2.5}$ or ozone formation. A MERP value is developed for each precursor pollutant from photochemical modeling validated by EPA and a "critical air quality threshold". The MERPs guidance relies on EPA's 2016 draft SILs for $PM_{2.5}$ and ozone as the critical air quality threshold to develop conservative MERPs values. As such, NO_X and VOC project emissions were assessed by separately derived ozone MERPs values. The project impacts on secondary ozone were determined by summing the VOC project emissions as a percentage of the VOC MERP with the NO_X project emissions as a percentage of the NO_X MERP. A value less than 100% indicates the combined impacts of VOC and NOx will not exceed the critical air quality threshold. As shown in Table 5 below, project impacts on 8-hour ozone were below the 100% threshold, demonstrating the project will not cause or contribute to a violation of the NAAQS.

Table 5 – Results of Tier I Screening Analysis for Ozone Precursors

Precursor	MERP (tpy)	Emission Increase (tpy)	Percentage of MERP
NOx	170	39.56	22 %
VOC	1,159	146.1	13 %
		Total	35 %

5.2 Class II Area Full Impact Air Quality Modeling Analysis

Class II Area NAAQS and PSD Increment full impact analyses were not required because project emission increases were below SERs for PSD pollutants with established NAAQS and Class II Area PSD Increments.

5.3 Non-Regulated Pollutant Impact Analysis for North Carolina Air Toxics

North Carolina G.S. 143-215.107(a) exempts certain emission sources subject to federal regulations – including sources subject to Maximum Achievable Control Technology (MACT) standards – from NC air toxics regulations provided their emissions do not "present an unacceptable risk to human health," in accordance with G.S. 143-215.107(b) as codified on May 1, 2014. Kiln K-7 is subject to a MACT standard, and NCDAQ conducted an evaluation of emissions from the modified kiln to ensure the modification posed no unacceptable risk to human health.

Potential emissions of several Toxic Air Pollutants (TAPs) will increase with the conversion of the kiln to a direct gasified wood-fired/ natural gas-fired continuous lumber drying kiln, and these emissions are provided in the table below. Emissions from both the drying of wood in Kiln K-7 and combustion of natural gas are included in the table. The emissions were then compared with the Toxics Permitting Emission Rate (TPER). As shown in Table 6 below, emissions of acrolein and phenol exceed their TPER after modification, and emissions from these TAPs were investigated further.

Table 6 – Emissions of TAPs Resulting from Conversion of Kiln K-7

TAP	Potential Emissions of TAPs from Modification			TPER			TPER Exceeded?
	lb/yr	lb/day	lb/hr	lb/yr	lb/day	lb/hr	
Acetaldehyde	3.5E+03	9.6E+00	4.0E-01			6.8	NO
Acrolein	5.1E+02	1.4E+00	5.8E-02			0.02	**YES**
Ammonia	6.6E+02	1.8E+00	7.5E-02			0.68	NO
Benzene	4.3E-01	1.2E-03	4.9E-05	8.1			NO
Benzo(a) pyrene	2.5E-04	6.8E-07	2.8E-08	2.2			NO
Formaldehyde	7.0E+03	1.9E+01	7.9E-01			0.04	NO
Hexane, n-	3.7E+02	1.0E+00	4.2E-02		23		NO
Phenol	6.7E+02	1.8E+00	7.7E-02			0.24	**YES**
Toluene	7.0E-01	1.9E-03	8.0E-05		98	14.4	NO

Notes:
- Potential emissions from Kiln K-7 include emissions from drying wood in the kiln and from natural gas combustion, as a conservative estimate.
- Ammonia and hexane are associated with the combustion of natural gas.
- Potential emissions were based on a throughput of 64.37 MMBF per year used as input in NCDAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007). Hourly TAP emissions were calculated assuming continuous operation of 24 hours per day.
- Potential emissions from natural gas combustion were based on NCDAQ's "Natural Gas Combustion Emissions Calculator Revision M" (06/22/2015), a maximum heat input of 24 million Btu/hr and 8,760 hours of operation.

In the next step in the NC air toxics evaluation, emissions of acrolein and phenol were compared with previously modeled emissions to determine if this modification poses an unacceptable risk to human health. Total emissions of acrolein and phenol (Facility-Wide Actual + Potential) are less than the total emissions used in the 2005 modeling. Given the margin of compliance of the previous modeling, the increased emissions in acrolein and phenol from the kiln conversion do not pose an unacceptable risk to human health.

Table 7 – Comparison of Emissions to Modeled Emissions

TAP	2005 Modeling Results		Total Emissions after modification (Facility-wide Actual + Potential) (lb/hr)
	Total Modeled Emissions (lb/hr)	% of the AAL	
Acrolein	0.377	12%	0.542
Phenol	1.131	3%	0.349

Notes:
- Actual emission over the last five years were highest 2019 for acrolein and were highest in 2015 for phenol.
- Air modeling was approved by Tom Anderson, meteorologist with the Air Quality Analysis Branch of the DAQ, in a memorandum dated September 15, 2005.

5.4 Additional Impact Analysis

Additional impact analyses were conducted for ozone, growth, soils and vegetation, and visibility impairment.

5.4.1 Growth Impacts

Jordan Lumber is an existing facility and there will be no additional permanent jobs added due to the proposed project. Therefore, this project is not expected to cause a significant increase in growth in the area.

5.4.2 Soils and Vegetation

For soils and vegetation, the relevant pollutants are NO_2, SO_2, and CO. The proposed project will not result significant emission increases for these pollutants, thus a soils and vegetation analysis was not required.

5.4.3 Class II Visibility Impairment Analysis

The relevant pollutants for visibility impairment are NO_2, SO_2, and PM. The proposed project will not result significant emission increases for these pollutants. Thus, a visibility impairment analysis was not required.

5.5 Class I Area - Additional Requirements

Four Federal Class I Areas are located within 300 km of Jordan Lumber – Swanquarter NWR, Linville Gorge Wilderness Area, James River Face Wilderness, and Cape Romain National Wildlife Refuge. The Federal Land Manager for each of those areas was contacted and none of them required any analysis. Thus, no analysis was conducted.

5.5.1 Class I Area Significant Impact Level Analysis

A Class I Area significant impact screening analysis was not required because project emission increases were below SERs for PSD pollutants with established Class I PSD Increments.

5.5.2 Class I Increment/Air Quality Related Values Regional Haze Impact and Deposition Analyses

The project does not include significant emissions of pollutants with established Class I Area Increments or Deposition Analysis Thresholds. The project also does not include significant emissions of visibility-impairing pollutants such as NOx, SO_2, PM2.5, and PM10. Therefore, analysis of project impacts on Class I Area Air Quality Related Values (AQRVs) was not required.

5.6 PSD Air Quality Modeling Result Summary

Based on the PSD air quality ambient impact analysis performed, the proposed project to increase throughput in Kiln K-7 at Jordan Lumber will not cause or contribute to any violation of the Class II NAAQS, PSD increments. Class I increments, or any FLM AQRVs.

6.0 Other Issues

6.1 Compliance

NCDAQ has reviewed the compliance status of Jordan Lumber. Jeffery Cole of FRO conducted the most recent compliance inspection at the facility on July 9, 2020. The Permittee appeared to be operating in compliance with all applicable air quality regulations and permit conditions at the time of inspection.

Jordan Lumber has the following history of noncompliance within the last five years:

- On September 28, 2015, NCDAQ issued Jordan Lumber a Notice of Violation/Notice of Recommendation for Enforcement (NOV/NRE) for failure to submit a Title V permit within 12 months of commencing operation of a boiler (ID No. B05). A civil penalty in the amount of $5,252, including costs, was assessed on December 3, 2015. The penalty was paid in full on 12/10/2015.

- On April 21, 2016, NCDAQ issued Jordan Lumber a NOV for failure to perform an initial tune-up on boiler B05, as required by the :NESHAP for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters," 40 CFR Part 63 Subpart DDDDD (MACT Subpart DDDDD). The Permittee also failed to conduct an annual internal inspection of multicyclone CD01 as required by control devices 15A NCAC 02D .0504 and 15A NCAC 02D .1109.

- On May 16, 2016, NCDAQ issued Jordan Lumber a NOV/NRE for failure to conduct source testing on boiler B04 as required by 15A NCAC 02D .1109. A civil penalty in the amount of $4,214 including costs, was assess on July 29, 2016. The penalty was paid in full on August 24, 2016.

- On June 27, 2016, NCDAQ issued Jordan Lumber a NOV for late submittal of a Notice of Compliance Status (NOCS) for boiler B05 as required by MACT Subpart DDDDD.

- On September 16, 2016, NCDAQ issued Jordan Lumber a NOV for late submittal of a test report for boiler B04 as required by 15A NCAC 02D .1109.[10]

- On December 2, 2016, NCDAQ issued Jordan Lumber a NOV/NRE for numerous monitoring and recordkeeping violations discovered during a compliance inspection on November 29, 2016. A civil penalty in the amount of $5,753, including costs, was assessed on March 16, 2017. The penalty was paid in full on April 25, 2017.

- On March 3, 2017, NCDAQ issued Jordan Lumber a NOV for submittal of a late annual compliance report for boiler B05 as required by MACT Subpart DDDDD.

- On March 21, 2017, NCDAQ issued Jordan Lumber a NOV/NRE for submittal of a late annual compliance certification. A civil penalty in the amount of $2,256, including costs, was assessed on July 25, 2017. The penalty was paid in full on July 31, 2017.

---

[10] The NOV states the test report is required under MACT Subpart DDDDD. However, this boiler was subject to the 15A NCAC 02D .1109 at that time.

- On December 20, 2018, NCDAQ issued Jordan Lumber a NOV/NRE for late submittal of a NOCS as required under 15A NCAC 02D .1109 for boilers B01 and B03. All of the compliance requirements had been met by the applicable deadlines as reported in the previous semi-annual report and the initial performance test report; however, the NOCS report summarizing this information was not submitted by the applicable deadline. The NCDAQ issued a decision not to enforce on this violation in a letter dated January 3, 2019.

All violations have been resolved.

6.2 Zoning Requirements

A local zoning consistency determination is required. A copy of the zoning consistency sent to Montgomery County Planning Department on August 25, 2020 was included in the PSD permit application.

6.3 Professional Engineer's Seal

A Professional Engineer's seal is not required for this modification.

6.4 Application Fee

An application fee in the amount of $15,406.00 was received with the PSD permit application on September 1, 2020.

6.5 Public Participation Requirements

In accordance with 40 CFR 51.166(q), public participation, the reviewing authority (NCDAQ) shall meet the following:

1) Make a preliminary determination whether construction should be approved, approved with conditions, or disapproved.

   This document satisfies this requirement providing a preliminary determination that construction should be approved consistent with the permit conditions described herein.

2) Make available in at least one location in each region in which the proposed source would be constructed a copy of all materials the applicant submitted, a copy of the preliminary determination, and a copy or summary of other materials, if any, considered in making the preliminary determination.

   This preliminary determination, application, and draft permit will be made available in the Fayetteville Regional Office and in the Raleigh Central Office, with the addresses provided below.

Fayetteville Regional Office	or	Raleigh Central Office
Systel Building		217 West Jones Street
225 Green Street, Suite 714		Raleigh, NC 27603
Fayetteville, NC 28301		

In addition, the preliminary determination and draft permit will be made available on the NCDAQ public notice webpage.

3) Notify the public, by advertisement in a newspaper of general circulation in each region in which the proposed source would be constructed, of the application, the preliminary determination, the degree of increment consumption that is expected from the source or modification, and of the opportunity for comment at a public hearing as well as written public comment.

   The NCDAQ prepared a public notice (See Attachment 1) that will be published in a newspaper of general circulation in the region.

4) Send a copy of the notice of public comment to the applicant, the Administrator and to officials and agencies having cognizance over the location where the proposed construction would occur as follows: Any other State or local air pollution control agencies, the chief executives of the city and county where the source would be located; any comprehensive regional land use planning agency, and any State, Federal Land Manager, or Indian Governing body whose lands may be affected by emissions from the source or modification.

   The NCDAQ will send the public notice (See Attachment 1) to William A. Zell, Town Manager of Mt. Gilead, PO Box 325, Mt. Gilead, NC 27306 and to Hiram Marziano, II, Manager of Montgomery County, Box 425, Troy, NC 27371.

5) Provide opportunity for a public hearing for interested persons to appear and submit written or oral comments on the air quality impact of the source, alternatives to it, the control technology required, and other appropriate considerations.

   The NCDAQ public notice (See Attachment 1) provides contact information to allow interested persons to submit comments and/or request a public hearing.

7.0 Conclusion

Based on the application submitted and the review of this proposal, the NCDAQ is making a preliminary determination that the project can be approved and a revised permit issued. After consideration of all comments, a final determination will be made.

Attachment 1

Public Notice for Jordan Lumber & Supply, Co.

PUBLIC NOTICE ON PRELIMINARY DETERMINATION REGARDING APPROVAL OF AN APPLICATION SUBMITTED UNDER THE "REGULATIONS FOR THE PREVENTION OF SIGNIFICANT DETERIORATION OF AIR QUALITY" FOR JORDAN LUMBER & SUPPLY, CO.

Jordan Lumber & Supply, Co. has applied to the North Carolina Department of Environmental Quality, Division of Air Quality (DAQ), Permitting Section, to make modifications to the facility located at 1959 Highway 109 South, Mt. Gilead, Montgomery County, North Carolina 27306. The proposed project includes the implementation of Best Available Control Technology for the conversion of a steam heated lumber kiln to a direct gasified wood-fired/ natural gas-fired continuous lumber kiln (ID No. K-7), operating at a maximum capacity of 67,340,000 board feet per year.

The proposed project is subject to review and processing under North Carolina Administrative Code (NCAC), Title 15A, Subchapter 02D .0530, "Prevention of Significant Deterioration" (PSD). The facility is defined as a "major stationary source" under PSD, and the proposed project is a "major modification" because it will result in a significant emissions increase of volatile organic compounds.

Jordan Lumber & Supply, Co.'s application has been reviewed by the DAQ, Air Quality Permitting Section in Raleigh, North Carolina to determine compliance with the requirements of the North Carolina Environmental Management Commission air pollution regulations.

A preliminary review, including analysis of the impact of the facility emissions on local air quality, has led to the determination that the project can be approved, and the DAQ air permit issued, if certain permit conditions are met.

Montgomery County is classified as an attainment area for all pollutants. Compliance with all ambient air quality standards and the PSD increments is projected.

Persons wishing to submit written comments or request a public hearing regarding the Air Quality Permit are invited to do so. Requests for a public hearing must be in writing and include a statement supporting the need for such a hearing, an indication of your interest in the facility, and a summary of the information intended to be offered at such hearing.

Written comment or requests for a public hearing should be postmarked no later than January 22, 2021 and addressed to daq.publiccomments@ncdenr.gov (please type "Jordan Lumber.20B" in the subject line) or mail written comments to: Betty Gatano, P.E., NC DEQ, Division of Air Quality, 1641 Mail Service Center, Raleigh, NC 27699 1641.

All comments received or postmarked by this date will be considered in the final determination regarding the Air Quality Permit. A public hearing may be held if the Director of the DAQ determines that significant public interest exists or that the public interest will be served.

A copy of all data and the application submitted by Jordan Lumber & Supply, Co, and other material used by the DAQ in making this preliminary determination are available for public inspection during normal business hours at the following locations:

Attachment 1

Public Notice for Jordan Lumber & Supply, Co.

NC DEQ Division of Air Quality Permitting Section 217 West Jones Street, Suite 4000 Raleigh, NC 27603	or	Fayetteville Regional Office Systel Building 225 Green Street, Suite 714 Fayetteville, NC 28301

Information on the proposed permit, the permit application, and the staff review is available on the DAQ website (https://deq.nc.gov/about/divisions/air quality/events) or by writing or calling:

NC DEQ
William D. Willets, P.E.
Chief, Permitting Section
North Carolina Division of Air Quality
1641 Mail Service Center
Raleigh, North Carolina 27699 1641
Telephone: 919 707 8400

After weighing relevant comments received by January 22, 2021 and other available information on the project, the DAQ will act on the PSD application.

Michael A. Abraczinskas, Director
Division of Air Quality, NCDEQ

Attachment 2

Emission Calculations for Jordan Lumber & Supply, Co.

PSD Applicability Summary									
	SO_2	PM	PM_{10}	$PM_{2.5}$	NO_x	CO	Pb	VOC	CO_2e
Project Emission Increases									
Projected Actual Emissions (K-07)	3.29	4.71	4.71	4.71	39.55	78.84	6.31E-03	146.13	27,548
Planer/Hog Waste Collection System		0.0004	0.0004	0.0004					
Total Project Emission Increases	3.29	4.71	4.71	4.71	39.55	78.84	6.31E-03	146.13	27,548
PSD Significant Emission Rates	40	25	15	10	40	100	0.6	40	75,000
Major PSD Review Required	NO	NO	NO	NO	NO	NO	NO	YES	NO

Attachment 2

Emission Calculations for Jordan Lumber & Supply, Co.

Jordan Lumber & Supply Co. - Mt. Gilead, NC

Kiln 7 Production Increase Application

FUTURE EMISSIONS

ES		Board-Foot	mmBTU	PM		PM-10		PM-2.5		SO2		NOx		CO		VOC		LEAD		CO2e	
ID	Scenario	Year	Year	E.F.	Emiss.	E.F.	Emiss.	E.F.	Emiss.	E.F.	Emiss	E.F.	Emiss.	E.F.	Emiss.	E.F.	Emiss.	E.F.	Emiss	E.F.	Emiss
K-7	**Wood Firing**	67,340,000	262,800	**0.14**	**4.71**	**0.14**	**4.71**	**0.14**	**4.71**	**0.025**	**3.29**	**0.301**	**39.55**	**0.600**	**78.84**	**4.34**	**146.13**	**0.000048**	**6.31E-03**	**9.51E+01**	**2.75E+04**
			(30 MMBtu/hr;	Lb/1k Bd-Ft	Ton/Yr	Lb/1k Bd-Ft	Ton/Yr	Lb/1k Bd-Ft	Ton/Yr	lb/MMBtu	Ton/Yr	lb/MMBtu[2]	Ton/Yr	lb/MMBtu	Ton/Yr	Lb/1k Bd-Ft	Ton/Yr	lb/MMBtu	Ton/Yr	kg CO_2e /MMBtu	Ton/Yr
			8,760 hr/yr)	Note 1		Note 1		Note 1		Note 2		Note 2		Note 2		Note 1		Note 2		Note 3	
K-7	**Natural Gas Firing**		210,240	**0.0075**	**0.78**	**0.0056**	**0.59**	**0.0019**	**0.20**	**0.00059**	**0.06**	**0.098**	**10.31**	**0.082**	**8.66**	**0.005**	**0.57**	**4.90E-07**	**5.15E-05**	**5.31E+01**	**1.23E+04**
			(24 MMBtu/hr;	lb/MMBtu	Ton/Yr	lb/MMBtu	Ton/Yr	lb/MMBtu	Ton/Yr	lb/MMBtu	Ton/Yr	lb/MMBtu	Ton/Yr	lb/MMBtu	Ton/Yr	lb/MMBtu	Ton/Yr	lb/MMBtu	Ton/Yr	kg CO_2e /MMBtu	Ton/Yr
			8,760 hr/yr)	Note 2		Note 2		Note 2		Note 2		Note 2		Note 2		Note 2		Note 2		Note 3	
Future Emissions (Max Scenario is wood combustion)					**4.71**		**4.71**		**4.71**		**3.29**		**39.55**		**78.84**		**146.13**		**6.31E-03**		**2.75E+04**

Notes:

1) DAQ spreadsheet factor for direct-fired gasifier kiln. https://deq.nc.gov/about/divisions/air-quality/air-quality-permits/application-forms-instructions/application-forms-air-quality-permit-construct-operate-non-title-v-title-v-facilities/spreadsheets

2) DAQ spreadsheets for natural gas and woodwaste firing. https://deq.nc.gov/about/divisions/air-quality/air-quality-permits/application-forms-instructions/application-forms-air-quality-permit-construct-operate-non-title-v-title-v-facilities/spreadsheets

3) 40 CFR Part 98 Mandatory Reporting Rule factors for wood and natural gas firing.

Jordan Lumber & Supply Co. - Mt. Gilead, NC

Kiln 7 Production Increase Application

HAP/TAP Emissions

FUTURE EMISSIONS

ES		Board-Foot	mmBTU	ACETALDEHYDE		ACROLEIN		AMMONIA		FORMALDEHYDE		N-HEXANE		METHANOL		PHENOL		TOLUENE	
ID	Scenario	Year	Year	E.F.	Emiss	E.F.	Emiss	E.F.	Emiss	E.F.	Emiss	E.F.	Emiss	E.F.	Emiss	E.F.	Emiss	E.F.	Emiss
K-7	**Wood Firing**	67,340,000	262,800	**0.052**	**3,502**	**0.0075**	**505**		**0**	**0.103**	**6,936**	**0**	**0**	**0.161**	**10,842**	**0.01**	**673**	**0**	**0**
			(30 MMBtu/hr;	Lb/1k Bd-Ft	Lb/Yr	Lb/1k Bd-Ft	Lb/Yr	Lb/1k Bd-Ft	Lb/Yr	Lb/1k Bd-Ft	Lb/Yr	Lb/1k Bd-Ft	Lb/Yr	Lb/1k Bd-Ft	Lb/Yr	Lb/1k Bd-Ft	Lb/Yr	Lb/1k Bd-Ft	Lb/Yr
			8,760 hr/yr)	DAQ Dir Fire		DAQ Dir Fire		DAQ Dir Fire		DAQ Dir Fire		DAQ Dir Fire		DAQ Dir Fire		DAQ Dir Fire		DAQ Dir Fire	
K-7	**Natural Gas Firing**		210,240	**1.49E-08**	**0.0031**	**1.76E-08**	**0.0037**	**3.14E-03**	**660.2**	**7.35E-05**	**0.01**	**1.76E-03**	**370.02**	**0.00E+00**	**0.00**	**0.00E+00**	**0.00**	**3.33E-06**	**0.70**
			(24 MMBtu/hr;	lb/MMBtu	Lb/Yr	lb/MMBtu	Lb/Yr	lb/MMBtu	Lb/Yr	lb/MMBtu	Lb/Yr	lb/MMBtu	Lb/Yr	lb/MMBtu	Lb/Yr	lb/MMBtu	Lb/Yr	lb/MMBtu	Lb/Yr
			8,760 hr/yr)	Note 2		Note 2		Note 2		Note 2		Note 2		Note 2		Note 2		Note 2	
Future Emissions (Max Scenario is wood combustion)					**3,502**		**505**		**660**		**6,936**		**370**		**10,842**		**673**		**0.70**

Notes:

1) DAQ spreadsheet factor for direct-fired gasifier kiln.

2) Natural gas emission factors from DAQ natural gas combustion worksheet.

Attachment 2

Emission Calculations for Jordan Lumber & Supply, Co.

PLANER/HOG WASTE COLLECTION SYSTEM
JORDAN LUMBER & SUPPLY, CO.
MT. GILEAD, NORTH CAROLINA

Emission Source ID: **P01 and P02**

Description: **Planer/hog waste collection system**

Production = 67,340,000 BD ft/yr (softwood)

Criteria	Direct Fired Lumber Drying			Total
	Emission Factor (lb/MBF)		Emission (ton/yr)	Emission (ton/yr)
PM	1.17E-05	(1)	3.94E-04	**3.94E-04**
PM-10	1.17E-05	(1)	3.94E-04	**3.94E-04**
PM-2.5	1.17E-05	(1)	3.94E-04	**3.94E-04**

Notes:

1. Emission factor is based on mass balance from past study at plant of 0.0117 lb/1,000 BD ft multiplied by a 99.9% control efficiency for the baghouse.